1. PURPOSE OF AND NEED FOR THE AGENCY ACTION

1.1 INTRODUCTION

This environmental impact statement (EIS) has been prepared by the U.S. Department of Energy (DOE), in compliance with the National Environmental Policy Act of 1969 (NEPA) as amended (42 USC 4321 et seq.), to evaluate the potential environmental impacts associated with the construction and operation of a project proposed by Southern Company in partnership with the Orlando Utilities Commission (OUC), which has been selected by DOE for further consideration under the Clean Coal Power Initiative (CCPI) program. The proposed project would demonstrate advanced power generation systems using Integrated Gasification Combined Cycle (IGCC) technology at OUC's Stanton Energy Center near Orlando, Florida. The facilities would convert coal into synthesis gas for generating 285 MW (megawatts) of electricity while substantially reducing emissions of sulfur dioxide (SO_2), oxides of nitrogen (NO_x), and mercury, as compared to conventional coal-fired power plants. The EIS will be used by DOE in making a decision on whether or not to provide cost-shared funding for project activities beyond preliminary design, including detailed design, construction, and operation of the proposed facilities.

1.2 CLEAN COAL POWER INITIATIVE

"Clean coal technologies" refer to advanced coal utilization technologies that are environmentally cleaner, and in many cases, more efficient and less costly than conventional coal-utilization processes. These technologies contribute to a major objective of the national energy strategy for reducing U.S. dependence on potentially unreliable energy suppliers. Because the abundant domestic reserves of coal provide one of the nation's most important resources for sustaining a secure energy future, DOE has pursued a research and development (R&D) program to increase the use of coal while improving environmental quality. However, technologies displaying potential at the proof-of-concept scale in an R&D program must be operated at a larger scale to demonstrate readiness for commercialization. The CCPI Program moves promising technologies from R&D to the commercial marketplace through demonstration. Successful demonstrations also help position the United States to supply advanced coal-fired combustion and pollution control technologies to a rapidly expanding world market.

In 2002, the U.S. Congress established the CCPI Program to accelerate commercial deployment of advanced coal-based technologies for generating clean, reliable, and affordable electricity in the United States. Congress indicated that projects in the program should be industry projects assisted by the government and not government-directed demonstrations. The projects are expected to showcase technologies in which coal-fired power plants can continue to generate low-cost electricity with improved efficiency and in compliance with more stringent environmental standards expected in the future.

In the CCPI Program, the project participant (i.e., the non-federal-government participant or participants) must finance at least 50% of the total cost of the project. The government assists the project participant by sharing in the project's cost, as detailed in a cooperative agreement negotiated between the participant and DOE. The government also shares in the rewards of successful projects through a negotiated repayment agreement.

The project participant is responsible for designing, constructing, and demonstrating the project. During project execution, the government oversees project activities, provides technical advice, assesses progress by periodically reviewing project performance with the participant, and participates in decision making at major project junctures. In this manner, the government ensures that schedules are maintained, costs are controlled, and project objectives are met.

The CCPI Program is open to any technology advancement related to coal-based power generation that results in efficiency, environmental, and economic improvement compared to currently available state-of-the-art alternatives. The program is also open to technologies capable of producing any combination of heat, fuels, chemicals, or other useful byproducts in conjunction with power generation. Coal for the demonstration projects is required to provide at least 75% of the fuel energy input to the process. This provision ensures that multiple-fuel concepts such as co-firing are not excluded, but that a focus is maintained on coal-based power generation. Additionally, projects must show the potential for rapid market penetration upon successful demonstration of the technology or concept.

DOE issued the first-round CCPI solicitation in March 2002, received 36 proposals in August 2002, and selected 8 projects in January 2003. DOE issued the second-round CCPI solicitation in February 2004 and received 13 proposals in June 2004. Four projects (including the proposed project) were selected in October 2004. One project withdrew after selection. Evaluation criteria used in the selection process included technical merit of the proposed technology, potential for a successful demonstration of the technology, and potential for the technology to be commercialized. DOE considered the participant's funding and financial proposal; DOE budget constraints; environmental, health, and safety implications; and program policy factors, such as selecting projects that represent a diversity of technologies, utilize a broad range of U.S. coals, and represent a broad geographical cross-section of the United States.

1.3 PROPOSED ACTION

The proposed action is for DOE to provide, through a cooperative agreement with Southern Company, cost-shared funding for the design, construction, and demonstration of the proposed Orlando Gasification Project at OUC's Stanton Energy Center near Orlando, Florida. DOE's share of the funding is estimated to be $235 million (about 41% of the total cost of approximately $569 million) for the proposed project (including a 4.5-year demonstration, data analysis, and process evaluation) to be conducted under the cooperative agreement. Although DOE funding would support the Orlando Gasification Project (i.e., the coal gasifier, synthesis gas cleanup systems, and supporting

infrastructure) only, the project would be integrated with a planned, privately funded, combined-cycle unit. Together, the Orlando Gasification Project and the related combined-cycle unit would constitute the IGCC facilities.

Southern Company, in partnership with OUC, conceived and proposed the project in response to the DOE solicitation. DOE's primary role would be to provide cost-shared funding for the proposed Orlando Gasification Project, and DOE's decision is whether or not to fund the project. DOE's limited involvement constrains the range of alternatives considered in the EIS (Section 2), and DOE will make its decision based on those alternatives.

The primary objective of the proposed project is to design, build, and operate a state-of-the-art commercial-scale coal gasifier and integrate them with a planned combined-cycle unit. Other objectives of the project include (1) to design, construct, and operate an advanced synthesis gas cleanup system that includes sulfur removal and recovery; high-temperature, high-pressure particulate filtration; ammonia recovery; and mercury removal; and (2) to demonstrate high availability, high thermal efficiency, low cost, and low emissions from the IGCC technology at commercial scale. The project would also provide an option for reliable and economical electricity to OUC's existing and future customers.

1.4 PURPOSE AND NEED

The purpose of the proposed Orlando Gasification Project is to demonstrate advanced coal gasification for power generation applications using IGCC technology at a sufficiently large scale to allow industries and utilities to assess the project's potential for commercial application. A successful demonstration would generate technical, environmental, and financial data from the design, construction, and operation of the facilities to confirm that the technology can be implemented at the commercial scale. The cost-shared contribution by DOE would help reduce the risk to the Southern Company team in demonstrating the technology at the level of maturity needed for decisions on commercialization.

Two principal needs would be addressed by the proposed project. First, the project would meet the Congressional mandate to demonstrate advanced coal-based technologies that can generate clean, reliable, and affordable electricity in the United States (Section 1.2). Second, the demonstration would provide a more cost-effective fuel supply for integration with a planned combined-cycle unit to generate electricity.

1.4.1 Commercial Demonstration

Since the early 1970s, DOE and its predecessor agencies have pursued a broadly based coal R&D program to ensure available and affordable energy supplies while improving environmental quality. This R&D program includes long-term activities supporting the development of innovative, unproven concepts for a wide variety of coal technologies through the proof-of-concept stage. However, the availability of a viable technology at the proof-of-concept stage is not sufficient to ensure its

continued development and subsequent commercialization. Before any technology can be seriously considered for commercialization, it must be demonstrated at a sufficiently large scale. Utilities and industries are generally reluctant to demonstrate technologies at an unproven scale in the absence of strong economic incentives or firm legal requirements. Implementation of the CCPI Program, with cost-shared funding from the federal government, has been endorsed by Congress and industry as a mechanism to accelerate the commercialization of innovative technologies to meet near-term environmental goals in the power industry and to reduce risk to an acceptable level through cost-shared funding. The proposed project was selected for demonstration in the CCPI Program as one of the projects that would best further these goals.

The largest existing gasifier of the type to be demonstrated, with a maximum coal-feed rate of 5,500 lb/hour, began operation in 1996 at the Power Systems Development Facility near Wilsonville, Alabama (a joint research facility sponsored by DOE, Southern Company, and other industrial participants). The design and operating parameters of the basic technology are well understood from the experience gained during this gasifier's operation, and its potential advantages to the power industry have been well established. The technology is now ready to be demonstrated on the proposed project's commercial scale to confirm these advantages, after which it is expected to be widely deployed as an advanced coal-based power generating technology.

The transport gasifier technology that would be demonstrated offers a simpler and more robust method for generating power from coal than other alternatives. It is unique among coal gasification technologies in that it is cost-effective when handling low rank coals and when using coals with high moisture or high ash content. These coals make up half the proven reserves in both the U. S. and the world. Moreover, the transport gasifier is capable of both air- and oxygen-blown operation. This inherent flexibility will allow it to readily adapt to other applications beyond power generation including chemical production and possible future carbon management requirements.

Nearly 50% of current electrical generating capacity in the United States is over 30 years old. Thus, much replacement or refurbishment of aging facilities is anticipated over the next several decades to continue to meet current electricity demand, and new capacity will be needed to keep pace with rising demand for electricity. Currently, about 55% of U.S. electricity requirements are met by power plants fired with pulverized coal. As the most abundant domestic energy source, coal continues to represent an attractive option for future power plants, particularly through advanced technologies that have the potential to dramatically improve environmental performance and efficiency. The abundance of U.S. coal reserves makes coal one of the nation's most important strategic resources for minimizing dependence on imported oil and sustaining a secure energy future. Based on existing mining technology, recoverable reserves of coal in the United States could supply coal consumption at current levels for nearly 300 years. However, advanced coal utilization technologies, such as those in the CCPI Program, must be successfully demonstrated if coal is to provide an environmentally acceptable and economically competitive source of energy in the 21st century.

The ability to show prospective domestic and overseas customers an operating facility rather than a conceptual or engineering prototype would provide a persuasive inducement to replicate the

technology. Data obtained on operational characteristics would allow prospective customers to assess the technology's potential for commercial application. Successful demonstration at a commercial scale would enhance prospects of exporting the technology to other nations and could provide the United States with an important advantage in the global competition for new markets. DOE would work closely with the project participants to develop plans for technology transfer and commercialization.

1.4.2 Cost-Effective Integration

The second need to be met by the proposed Orlando Gasification Project is to provide a more cost-effective fuel supply for integration with the planned combined-cycle unit to generate electricity. As a public utility, OUC has an obligation to provide reliable and economical electric power service to its existing and future customers. To meet this obligation, OUC conducts long-range planning to predict its future power supply needs and to evaluate available options, including conservation, to meet those needs. Florida statutes require utilities to prepare 10-year planning documents. The objective of the planning process is to ensure that future service remains economical and reliable, while meeting all environmental regulatory requirements and standards. Based on the anticipated continuing growth in the Orlando area, OUC's latest plan has projected a need for approximately 300 MW of additional generating capacity in the 2010 timeframe (Black & Veatch 2005). The combined-cycle unit is proposed to meet that need, and the Orlando Gasification Project, in turn, is proposed to meet the need for a more cost-effective fuel supply (i.e. coal-derived synthesis gas compared to natural gas) for the combined-cycle unit. A successful cost-effective integration would enhance the potential for widespread commercialization of the technology, as discussed in Section 1.4.1.

1.5 NATIONAL ENVIRONMENTAL POLICY ACT STRATEGY

In compliance with NEPA, this EIS has been prepared for the Orlando Gasification Project for use by DOE decision makers in determining whether or not to provide cost-shared funding for project activities beyond preliminary design, including detailed design, construction, and operation of the proposed facilities. DOE's policy is to comply fully with the letter and spirit of NEPA, which ensures that early consideration is given to environmental values and factors in federal planning and decision making. The EIS evaluates the environmental impacts of alternatives and provides a means for the public to participate in the decision making process. The extent of actions taken by DOE with regard to any proposal, including project selection or award, is limited prior to completion of the NEPA process (i.e., no funds will be provided for project activities that could either have an adverse impact on the environment or limit the choice of reasonable alternatives).

An overall strategy for compliance with NEPA has been developed for the CCPI Program, consistent with the Council on Environmental Quality (CEQ) NEPA regulations (40 CFR Parts 1500-1508) and DOE regulations for compliance with NEPA (10 CFR Part 1021). The DOE strategy has

two principal elements. The first element involved proposers completing a DOE environmental questionnaire, along with submission of a technical proposal to the CCPI solicitation. The responses to the questionnaire contained discussions of the site-specific environmental, health, safety, and socioeconomic issues associated with each project.

The second element consists of preparing site-specific NEPA documents for each selected project. For this project, DOE has determined that providing cost-shared funding for the proposed project would constitute a major federal action that may significantly affect the quality of the human environment. Therefore, DOE has prepared this EIS to assess the potential impacts on the human environment of the proposed action and reasonable alternatives. DOE has utilized information from the environmental information volume prepared by the Southern Company team for the proposed project, as well as from sources provided by government agencies and others. The EIS has been prepared in accordance with Section 102(2)(C) of NEPA, as implemented under regulations promulgated by the CEQ (40 CFR Parts 1500-1508) and as provided in DOE regulations for compliance with NEPA (10 CFR Part 1021). The EIS is organized according to CEQ recommendations (40 CFR Part 1502.10).

A Notice of Intent to prepare the EIS and hold a public scoping meeting was published by DOE in the *Federal Register* on August 11, 2005 (70 *FR* 46825–28). The Notice of Intent invited comments and suggestions on the proposed scope of the EIS, including environmental issues and alternatives, and invited participation in the NEPA process. The Notice of Intent and other information to announce the public scoping meeting were sent to 18 publications, radio stations, and television stations in Florida. An advertisement publicizing the public scoping meeting was printed in the *Orlando Sentinel* newspaper on August 23, 2005. An information packet including the Notice of Intent was delivered to 99 stakeholders including federal, state, and local agencies and environmental groups to announce the meeting and solicit comments on the proposed project. Flyers announcing the meeting were distributed in the community. Postcards publicizing the meeting were mailed to 4,313 residents and businesses within a 2-mile radius of the Stanton Energy Center.

Publication of the Notice of Intent initiated the EIS process with a public scoping period for soliciting public input to ensure that (1) significant issues are identified early and appropriately addressed, (2) issues of little significance do not consume time and effort, and (3) delays occasioned by an inadequate EIS are avoided (40 CFR Part 1501.7). DOE held the scoping meeting in Orlando, Florida, on August 30, 2005. The public was encouraged to provide oral comments at the scoping meeting and to submit additional comments in writing to DOE by the close of the EIS scoping period on September 16, 2005.

DOE received 11 oral responses at the public scoping meeting and 11 responses by comment card, mail, e-mail, and telephone from members of the public, interested groups, and federal, state, and local officials. The responses assisted in establishing additional issues to be analyzed in the EIS and in determining the level of analysis required for each of the issues. Issues raised during public scoping are identified in Section 1.6.

1.6 SCOPE OF THE ENVIRONMENTAL IMPACT STATEMENT

This section summarizes the issues and alternatives identified and considered during the preparation of this EIS for the proposed project. The following issues were initially identified as requiring analysis and assessment in the EIS and were included in the Notice of Intent:

1. Atmospheric Resources: potential air quality impacts resulting from air emissions during construction and operation of the proposed project (e.g., effects of ground-level concentrations of criteria pollutants, and trace metals including mercury, on surrounding residential areas and resource areas of special concern, such as Prevention of Significant Deterioration Class I areas); potential effects of greenhouse gas emissions;
2. Water Resources: potential effects from withdrawal of groundwater (the proposed project would discharge no liquid effluent from the site);
3. Infrastructure and Land Use: potential effects on infrastructure and land (including wetlands) resulting from the proposed facilities; potential traffic effects resulting from trains required to transport coal for the proposed project; potential impacts from a new electrical interconnection consisting of a short, onsite transmission line and several associated structures;
4. Solid Waste: pollution prevention and waste management, including potential solid waste impacts caused by the generation, treatment, transport, storage, and disposal of ash and other solid wastes;
5. Visual Impacts: potential aesthetic impacts associated with a new stack, mechanical-draft cooling tower, and other plant structures;
6. Floodplain: potential impacts (e.g., impeding floodwaters, re-directing floodwaters, onsite property damage) of siting new structures and infrastructure within a floodplain (e.g., onsite transmission line for electrical interconnection from the combined-cycle facilities to the existing onsite substation);
7. Wetlands: potential reduction of wetlands due to new construction (e.g., onsite transmission line for electrical interconnection);
8. Ecological Resources: potential onsite and offsite impacts to vegetation, terrestrial wildlife, aquatic wildlife, threatened and endangered species, and ecologically sensitive habitats;
9. Safety and Health: construction-related safety, process safety, and management of chemicals and catalysts;
10. Construction: potential impacts associated with noise, traffic patterns, and construction-related emissions;
11. Community Impacts: potential congestion and other impacts to local traffic patterns; socioeconomic impacts on public services and infrastructure (e.g., police protection, schools, and utilities); noise associated with project operation; and environmental justice with respect to the surrounding community; and

12. Cumulative effects that result from the incremental impacts of the proposed project (e.g., incremental air emissions affecting ambient air quality) when added to other past, present, and reasonably foreseeable future actions, including the existing Stanton Energy Center and the related action of the combined-cycle turbines.

During the scoping process (Section 1.5), the public expressed concerns about (1) consideration of alternatives to the proposed project and (2) potential environmental impacts that could result from the project. The comments on alternatives suggested considering alternatives to coal-based technologies (e.g., solar energy), as well as the need for the project (i.e., consideration of the no-action alternative). The potential effects that the public expressed the most concern about were: (1) air quality impacts due to air emissions from the proposed facilities, including criteria pollutants and hazardous air pollutants such as trace metals (e.g., mercury); (2) impacts (e.g., global climate change) due to greenhouse gas emissions from the proposed facilities; and (3) exacerbation of existing local traffic congestion. Other concerns that were expressed during the scoping process were potential human health risks (e.g., asthma) due to air emissions including carcinogens from the proposed facilities; acidic deposition; impacts to water resources including water use; solid waste, including disposition of hazardous waste and ash, and impacts to the adjacent landfill; floodplain impacts, including flooding and drainage issues; protection of wetlands; ecological impacts, including potential loss of habitat and impacts to protected species; social and economic impacts (positive and negative) including environmental justice; noise impacts; construction impacts; impacts associated with coal mining to obtain feedstock for the proposed project; transportation of coal; regulatory requirements; indirect (induced) impacts; cumulative effects; mitigation measures, including incorporation of carbon sequestration as part of proposed operations; and the use of alternative feedstocks (e.g., biomass) by the proposed facilities.

DOE considered public input obtained during the scoping process to add to the list of issues to be analyzed and to provide additional focus to analysis of initially identified issues. Table 1.6.1 lists the composite set of issues identified for consideration in the EIS (i.e., issues identified in the Notice of Intent, and additional relevant issues identified during public scoping that expanded the scope of the assessment). Issues are analyzed and discussed in this EIS in accordance with their level of importance. The most detailed analyses focus on issues associated with air quality, greenhouse gas emissions, traffic, aesthetics, and ecological resources.

Table 1.6.1. Issues identified for consideration in the environmental impact statement

Issues identified in the Notice of Intent		
Atmospheric resources	Visual impacts	Safety and health
Water resources	Floodplain	Construction
Infrastructure and land use	Wetlands	Community impacts
Solid waste	Ecological resources	Cumulative effects
Additional issues identified during public scoping that expanded the scope of the assessment		
Coal mining impacts	Alternative feedstocks	Asthma from air emissions

An EIS must analyze the range of reasonable alternatives to the proposed action. The purpose of and need for the proposed action determines the range of reasonable alternatives. Alternatives to the proposed project that were considered initially as candidates for analysis in this EIS (i.e., approaches that are practical or feasible both technically and economically) are identified and briefly described in the following bullets:

- ***No-action alternative***. DOE would not provide cost-shared funding for the design, construction, and demonstration of the proposed Orlando Gasification Project at OUC's Stanton Energy Center near Orlando, Florida. In the absence of DOE funding, Southern Company and/or OUC could reasonably pursue at least one option. The combined-cycle facilities could be built at the Stanton Energy Center without the gasifier, synthesis gas cleanup systems, and supporting infrastructure. The combined-cycle facilities would operate using natural gas as fuel without the availability of synthesis gas.
- ***Alternative site***. The proposed project would be demonstrated at another site. However, site selection was governed primarily by benefits that could be realized by the companies participating in the project. The site selected for the project had to provide the maximum benefit to the companies by closely meeting the project's technical needs and integrating with existing infrastructure. The Southern Company team members selected the Stanton Energy Center site in part because the cost associated with construction of the proposed facilities at an undeveloped site would be much higher and the environmental impacts likely would be much greater than at an existing plant. The Stanton Energy Center was the only site given detailed consideration or evaluation by Southern Company team members during their site selection process and was the only location identified in their proposal responding to DOE's second-round CCPI solicitation.
- ***Alternative configuration***. The proposed Orlando Gasification Project would be integrated with the existing Stanton A combined-cycle unit, which would require retrofitting Stanton A to combust synthesis gas. Under this scenario, the planned new combined-cycle unit would still be built, but probably would operate as a natural gas-fired unit. The same gasifer and support facilities would be constructed in nearly the same location, with independent construction of the same planned combined-cycle unit in essentially the same location on essentially the same schedule.

- ***Alternative size***. The proposed project would be demonstrated using a smaller-sized plant. This alternative would not meet the project's purpose (Section 1.4). A smaller-sized plant would not be sufficiently large to demonstrate the commercial viability of the technology. Also, a smaller-sized plant would not satisfy OUC's projected need for additional generating capacity (Section 1.4.2).
- ***Alternative technologies***. DOE would demonstrate other technologies. This alternative would not demonstrate advanced power generation systems using IGCC technology and may not meet DOE's need to demonstrate advanced coal utilization technologies with potential to address domestic energy needs (Section 1.4).

In addition to the proposed project, the no-action alternative was determined to require consideration in the EIS. The four other alternatives were dismissed from further consideration (i.e., alternative site, alternative configuration, alternative size, and alternative technologies). Alternatives and the basis for their consideration or dismissal are discussed in detail in Section 2.

1.7 APPROACHES AND ASSUMPTIONS

The following approaches are used and assumptions are made in this EIS:

- Except as specifically noted in the text, potential environmental effects of the proposed facilities are based on the operating characteristics discussed in Section 2.
- One major exception to the above is that air quality impacts predicted by air dispersion modeling are based on the conservative assumption that the proposed IGCC facilities operate at a 100% capacity factor rather than the expected 85% capacity factor.
- Potential environmental impacts are assessed for the surrounding environment (beyond the boundary of the Stanton Energy Center), as described in Section 3.
- Potential environmental impacts resulting from construction and operation of the proposed facilities during the demonstration period are assessed in Section 4. Section 5 addresses potential impacts of commercial operation following completion of the demonstration.